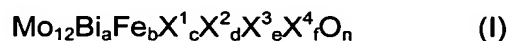


We claim:

1. A process for partially oxidizing propene to acrolein in the gas phase under heterogeneous catalysis by conducting a starting reaction gas mixture comprising propene, molecular oxygen and at least one inert gas, and containing the molecular oxygen and the propene in a molar $O_2:C_3H_6$ ratio of ≥ 1 , in one reaction stage over a fixed catalyst bed which is arranged in two spatially successive reaction zones A, B, the temperature of reaction zone A being a temperature in the range from 290 to 380°C and the temperature of reaction zone B likewise being a temperature in the range from 290 to 380°C, and whose active composition is at least one multimetal oxide comprising the elements Mo, Fe and Bi, in such a way that reaction zone A extends up to a conversion of propene of from 40 to 80 mol% and, on single pass of the starting reaction gas mixture through the entire fixed catalyst bed, the propene conversion is ≥ 90 mol% and the selectivity of acrolein formation, based on converted propene, is ≥ 90 mol%, the chronological sequence in which the starting reaction gas mixture flows through the reaction zones corresponding to the alphabetic sequence of the reaction zones, wherein
 - a) the hourly space velocity of the propene contained in the starting reaction gas mixture on the fixed catalyst bed is < 160 l (STP) of propene/l of fixed catalyst bed·h and ≥ 90 l (STP) of propene/l of fixed catalyst bed·h,
 - b) the volume-specific activity of the fixed catalyst bed is either constant or increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed, and
 - c) the difference $T^{\max A} - T^{\max B}$, formed from the highest temperature $T^{\max A}$ which the reaction gas mixture has within reaction zone A and the highest temperature $T^{\max B}$ which the reaction gas mixture has within reaction zone B, is $\geq 0^\circ\text{C}$.
2. A process as claimed in claim 1, wherein the difference $T^{\max A} - T^{\max B}$ is $\geq 0^\circ\text{C}$ and $\leq 80^\circ\text{C}$.
3. A process as claimed in claim 1, wherein the difference $T^{\max A} - T^{\max B}$ is $\geq 3^\circ\text{C}$ and $\leq 70^\circ\text{C}$.
4. A process as claimed in claim 1, wherein the difference $T^{\max A} - T^{\max B}$ is $\geq 20^\circ\text{C}$ and $\leq 60^\circ\text{C}$.

5. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the propene contained in the starting reaction gas mixture on the fixed catalyst bed is ≥ 90 l (STP) of propene/l·h and ≤ 155 l (STP) of propene/l·h.
- 5 6. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the propene contained in the starting reaction gas mixture on the fixed catalyst bed is ≥ 100 l (STP) of propene/l·h and ≤ 150 l (STP) of propene/l·h.
- 10 7. A process as claimed in any of claims 1 to 6, wherein the active composition of the fixed catalyst bed is at least one multimetal oxide of the general formula I



where the variables are defined as follows:

- 15 X^1 = nickel and/or cobalt,
 X^2 = thallium, an alkali metal and/or an alkaline earth metal,
 X^3 = zinc, phosphorus, arsenic, boron, antimony, tin, cerium, lead and/or tungsten,
 20 X^4 = silicon, aluminum, titanium and/or zirconium,
- a = from 0.5 to 5,
 b = from 0.01 to 5, preferably from 2 to 4,
 c = from 0 to 10, preferably from 3 to 10,
 25 d = from 0 to 2, preferably from 0.02 to 2,
 e = from 0 to 8, preferably from 0 to 5,
 f = from 0 to 10 and
 n = a number which is determined by the valency and frequency of the elements other than oxygen in I.

- 30 8. A process as claimed in any of claims 1 to 7, wherein the volume-specific activity of the fixed catalyst bed increases at least once.